U.S. DEPARTMENT OF COMMERCE
NATIONAL OCEANIC AND ATMOSPHERIC ADMINISTRATION
NATIONAL WEATHER SERVICE
NATIONAL METEOROLOGICAL CENTER

OFFICE NOTE 232

Proposed Changes to the Facsimile System

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APRIL 1981

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The facsimile switching system is rather unique to the National Weather Service. The only similar system is at Offut and that was partly engineered with the aid of NWS personnel. The system consists of an IBM host (either a 360-30 or 360-40) and three Interdata-50 (ID50) computers configured as programmable front-ends. The use of a mini-computer as a front end allows us the option of rather easily building special interface boards. Two proto-type boards were hand-built and then production ones were built by a contractor both for the Air Force and NWS. One board, the facsimile transmitter contained an interface to transfer a bit pattern representing a facsimile scan line into a communication circuit as a properly coded WMO facsimile signal. The computer micro-code can transfer an entire facsimile line from memory at the rate required by the speed of the circuit. The page margin time is sufficient to interupt the computer so as to provide new line buffers, handle the input queues and unpack new lines. There are control commands that set the carrier frequency and speed appropriate to the circuit. There are provisions for the start tone, phasing signal, and MOMS (a facsimile label signal) code. There are also provisions for interfacing the DACOM (a data compression processor) encoder in the DIFAX or AFDIGS mode, and producing the APT (a facsimile standard) signal for WEFAX.

The facsimile receiver can decode a standard facsimile signal, detect the start tone, phase, and digitize the incoming signal line-by-line. It can store in computer memory through micro-code an entire digitized line which the computer program can pack and buffer out the output queue.

Figure 1 shows the present configuration. There are three ID50's F1, F2 and G1 acting as control boxes on the computer's selector channel 2. F1 and F2 each have six transmit boards some of which have computer controlled outboard switches that can go into one circuit or another as required. Two device addresses are assigned to the driver for each port so that a two-panel chart can be created on-the-fly where the product on the left is different from that on the right. Also there are two devices for a virtual console so that the control program can be commanded to start or stop a line and to pass parameters. G1 contains the digitizer board which has an outboard switch enabling it to digitize charts from either Montreal (MOCAN) or Miami (TROPAN). It also has a bi-synchronous driver which enables it to transmit to other mini-computers. It drives four ports: two high-speed to the World Weather Building (WWB), one to Offut to input to AFDIGS, and one shared by two FAA destinations. It also has a virtual console. The World Weather Building has two ID50's each equiped with a Varian electro-graphic printer and an Alden flat-bed digitizer.

The control program is in the IBM computer. It handles 18 schedules for transmitting or receiving. It queues traffic from the digitizers. A separate

mechanism enqueues traffic from the 360-195. When a line is free it examines the schedule for a new entry. If the next entry is marked for a fixed time and is not yet due the line is put to sleep until a time interupt causes a new test. If the event is scheduled and available, the start up program will send a command with the parameters to the correct line to commence initialization and find the beginning (or beginnings) of the product and fill the first buffers.

The so-called floating schedule is used on Difax, Offut, HONO, Alaska, San Juan and FAA. In this mode a window is scanned for a candidate chart. The window is approximately one-hour early to one-hour late but is adjustable. The schedule must be designed to transmit no more charts per hour than the circuit can carry. Charts are scheduled by priority. Highest priority are scheduled immediately at the time they could be ready for transmission. Charts with a low urgency can be scheduled with a very long hold (up to 5 hours) so as not to overfill the schedule. At each new event the schedule is scanned forward in time for the first available product which is ready. A product that is late due to machine problems or whatever will be passed over and then picked up on the next search that is ready. When an event is about an hour overdue, it is logged out as not available and may require attention to find out what happened. In any event it will require manual intervention to be transmitted.

There had to be special handling for multi-parts to ensure that all parts were available before the product was released. Back-up charts have a fixed time mark on them so they will not be released early and the prime chart has a back-up flag so that it will not only mark itself as having been sent but also cancel the backup. There is one problem that shows up in the field. Charts that are entered from the digitizer are logged as available as soon as they are started instead of when they are fully entered. This is because of the deadline of the North American Surface Chart. It is necessary for the chart to start on NAFAX before it has been completely digitized. This means that if there is a stop and restart while digitizing the partial chart may be already going into the circuit and lacks an end of file. This allows an event to run off the end into some arbitrary product.

The problem with the current system is overloading on G1 with the growth of program. The two 50 KB lines to WWB are a heavy load by themselves, Offut has been increasing and the input digitizer lines have caused some trouble. This results in chronic trouble at WWB which impacts digitizing of manual products. We are undertaking a program to update the system to figure 2. We have an extra ID50 which was acquired second-hand last year and has been used for program testing. We will split the two 50 KB lines one to each machine. This will greatly reduce the stress on the machines and allow the lines to the WWB to act more independently. This will make place for a few more ports. We have tentatively committed a second port for the FAA. They are seeking two graphic ports for AFOS graphics for the new FAA distribution system. This could be accomodated along with a reduction by one of the number of ports in each machine. The increase of WEFAX requires more input

of long charts from Miami. A separate digitizer port for Miami and Montreal could be managed. Offut's requirements are going to increase so tentatively they should be on the more lightly loaded machines.

Some other changes show in this configuration. WEFAX (Central) will have a full schedule intended to replace the broadcast. WEFAX (West) will have a broadcast schedule for Guam, Wake Island, Philipine Islands, and Australia to replace the radio fax broadcast from Honolulu. WEFAX (East) will carry some products required in Europe and the Mediterranean. Namfax disappears.

Glossary of Acronyms

AFDIGS - Air Force Digital Graphics System. A compressed digital graphics system delivered to the Air Force by the Alden and Rapifax companies and operates out of computers based at Offut (originally procured and configured by NMC).

AFOS - Automated Field Operations System.

APT - Automatic Picture Taking system. This was a system for taking pictures of the earth from the first weather satellite. It set a standard for the satellite facsimile signal different from the WMO standard. Although the method of forming the picture on the satellite has changed the ground system is very widely used in satellite work.

DACOM - A patented data compression digital facsimile system used in the DIFAX circuit. It is currently marked by Rapifax.

MOMS - MOde and Map Selection. This is a signal sent before a chart in certain fax circuits to set certain terminal conditions and to label the event to follow so as to allow user rejection of unwanted charts.

WEFAX - Weather Facsimile. This is one of the functions of a GOES satellite. It broadcasts a facsimile signal sent on the uplink so that it can be received within about 4000 miles of the sub-satellite point on air APT receiver.

WMO - World Meteorological Organization. An intergovernment agency located in Geneva Switzerland that sets standards for the interchange of weather data.

WWB - A building at 5200 Auth Road, Camp Springs, Md., where the offices of the National Meteorological Center are located.

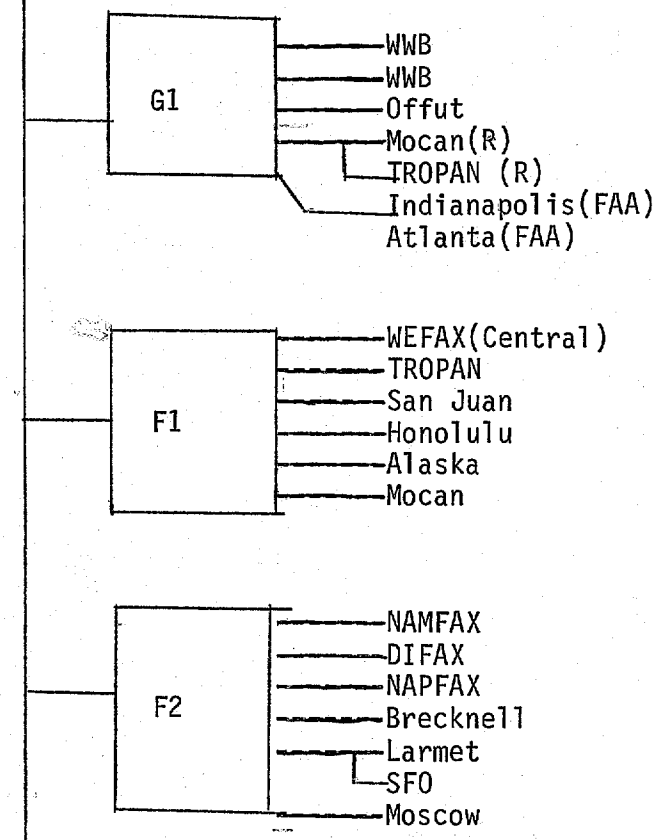

Figure #1. FAX NOW March 1981

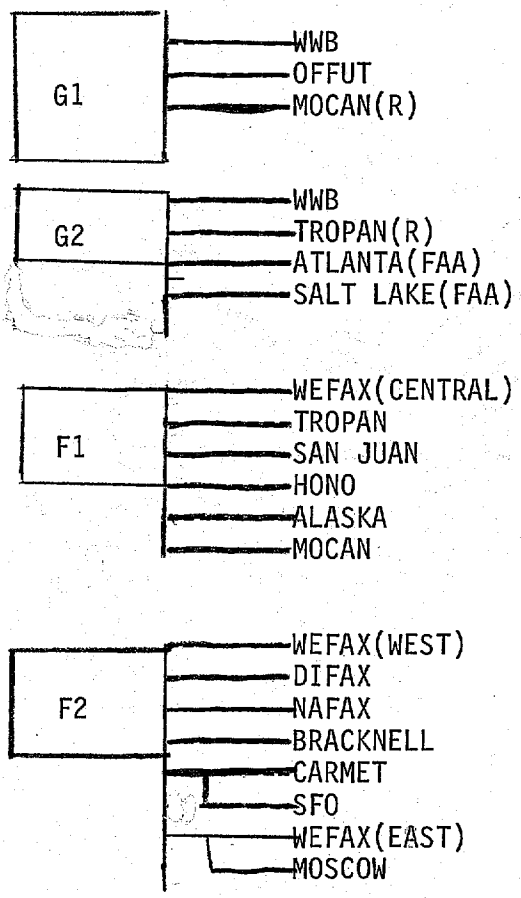

Figure #2. FAX THEN March 1982